

Drinking water: Alum in water treatment



Aluminium sulfate or Alum is used as a flocculant to remove unwanted colour and turbidity from water supplies. It has been used since ancient times for this purpose and its use together with filtration is standard practice in conventional water treatment processes around the world. After performing its role the Alum is filtered from the water but a small fraction dissolves and is not removed.

**The use of
alum to treat
drinking
water is safe**

Concerns about alum

There has been ongoing debate in the water industry for a number of years regarding the use of alum in the water treatment process and the 'suspicion' that aluminium is linked to Alzheimer's disease. The cause of Alzheimer's disease is subject to international research. A variety of possible causes have been considered, however, no link between aluminium intake and the disease has been established.

Research findings

The CSIRO has conducted extensive research in this matter and in late 1998 found convincing evidence that the use of alum to treat drinking water is safe. The CSIRO found that the aluminium we obtain from treated drinking water is an insignificant amount: only 1 to 2% of our daily intake of aluminium comes from water and only the barest trace of this is absorbed. Most of the aluminium absorbed is excreted through urine.

Sydney Water's treatment process

Sydney Water decided to stop using alum in their water treatment process in 1996. At that time Sydney was constructing new water treatment plants and was able to make this decision without incurring conversion costs. Furthermore, the research findings mentioned above had not been published at that time.

Occurrence of alum

Aluminium is the third most abundant element and comprises about 8% of the earth's crust. It is never found in its natural form as a pure metal but is always locked in, or mixed with, other elements as very stable chemical compounds such as alumino-silicates. It occurs in most rocks, vegetation and soils (such as clay etc) in this combined form. Aluminium is widely used in many industrial and domestic products including antacids, antiperspirants and food additives, and in vaccines. It is commonly used in the food industry as food containers and packaging and many cooking utensils are made of aluminium. It occurs naturally in many foods.



What are the health effects of consuming aluminium?

Aluminium is an abundant element and is present in most soils including clay particles. The usual laboratory testing method measures both dissolved aluminium as well as the aluminium that is present in any soil particles present. Acid-soluble aluminium is what remains after adding acid to the water sample and filtering out the remaining particles, which can contain aluminium that is acid-insoluble.

The significance of this is that for aluminium to be absorbed by the human body, it must be dissolved by the stomach acids. Such acidsoluble aluminium is said to be bioavailable. For normal water consumption the National Health and Medical Research Council (NHMRC) and the World Health Organisation have reviewed the toxicological data for aluminium and concluded that there are insufficient data to set a No Effect Level.

NHMRC said that although data are insufficient to set a guideline value based on health considerations, there is public concern over the possible health effects of aluminium and that this issue should be reviewed when further studies are undertaken, particularly on the possible casual link between aluminium concentration and Alzheimer's Disease and on the bioavailability of aluminium.

Kidney dialysis patients can accumulate aluminium in their blood, resulting in dialysis dementia and are much more susceptible to aluminium in the dialysis fluid than from other sources such as food or antacids. Reverse osmosis or deionisation units are now used to treat dialysis water before use and aluminium levels are kept below 0.01 mg/L.

How does alum enter drinking water?

Aluminium occurs naturally and may be present in water due to natural leaching of soil and rock and levels of up to 18 mg/L have been found in the Murray River. However, most of this aluminium would be in the acid-insoluble form. It can also be present as a residual from the use of alum as a flocculant in water treatment. This would be in the acid-soluble form but should not contribute significant concentrations if the water treatment process is optimised.

Is water the only source of alum?

No. It has been estimated that its intake from food and beverages is approximately 5-20 mg/day. Research sponsored by WSAA (Water Services Association of Australia) has shown of the order of 0.4 to 1% of the lifetime body burden of bioavailable aluminium comes from alum treated drinking water, a minor proportion considering the relatively large and variable intake of aluminium from food. Hence if a link between aluminium and health were ever established, significant reduction in aluminium intake could only result from dietary change.

How can you test water for aluminium?

Testing for aluminium is a routine procedure using well accepted laboratory methods. Can water be treated to remove aluminium? Aluminium concentrations in drinking water can be reduced by utilising the conventional water treatment practices of flocculation and filtration. A well operated water filtration plant, even using alum as a flocculant, can achieve aluminium concentrations in the finished water of less than 0.1 mg/L.

What is the extent of the problem?

The problem is an on-going worldwide one whereby aluminium is circumstantially linked with disease such as Alzheimer's, whilst producing no evidence that can stand up to peer review, sufficient to convince any Medical Health Authority in the world that aluminium actually is a health hazard. Health authorities worldwide have said that whilst there is no epidemiological evidence to show that aluminium is a health hazard, they will keep the situation under review.



Background of this fact sheet

This fact sheet was based on a fact sheet from the Water Services Association of Australia (WSAA), which was produced for use by members of WSAA. This fact sheet is intended to provide general information in relation to its subject matter and includes information obtained from a number of sources. Over time, changes in industry standards and legislative requirements, as well as technical advances and other developments or factors relevant to the information contained in this fact sheet, may have affected the accuracy of that information. Accordingly caution should be exercised in relation to the use of the information in this Fact Sheet. Any views expressed do not represent the views or policy of WSAA, or any member of WSAA. No responsibility is accepted by WSAA, the editor, author, individual contributors or the suppliers of information, for the accuracy of any information contained in this fact sheet or the consequences of any person relying upon any information.



For more information



1300 657 657



www.hunterwater.com.au



Hunter Water